Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

Working on Your Computer
Removing and Replacing Parts
Specifications
System Board Layout
System Setup
Diagnostics

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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Working on Your Computer

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- Before Working Inside Your Computer
- Recommended Tools
- Turning Off Your Computer
- After Working Inside Your Computer

Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help to ensure your personal safety. Unless otherwise noted, each procedure included in this document assumes that the following conditions exist:

- You have performed the steps in Working on Your Computer.
- You have read the safety information that shipped with your computer.
- A component can be replaced or—if purchased separately—installed by performing the removal procedure in reverse order.

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell is not covered by your warranty.

CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface, such as a connector on the back of the computer.

CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

CAUTION: When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

NOTE: The color of your computer and certain components may appear differently than shown in this document.

To avoid damaging your computer, perform the following steps before you begin working inside the computer.

1. Ensure that your work surface is flat and clean to prevent the cover from being scratched.
2. Turn off your computer (see Turning Off Your Computer).

CAUTION: To disconnect a network cable, first unplug the cable from your computer and then unplug the cable from the network device.

3. Disconnect all network cables from the computer.
4. Disconnect your computer and all attached devices from their electrical outlets.
5. Press and hold the power button while the computer is unplugged to ground the system board.
6. Remove the cover (see Removing the cover).

CAUTION: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity, which could harm internal components.

Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Phillips screwdriver
- Small plastic scribe
- Flash BIOS update program media

Turning Off Your Computer

CAUTION: To avoid losing data, save and close all open files and exit all open programs before you turn off your computer.

1. Shut down the operating system:

   - **In Windows Vista®:**

     Click **Start** , then click the arrow in the lower-right corner of the **Start** menu as shown below, and then click **Shut Down**.

   - **In Windows® XP:**

     Click **Start**® **Turn Off Computer**® **Turn Off**.

     The computer turns off after the operating system shutdown process is complete.

2. Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 6 seconds to turn them off.

After Working Inside Your Computer

After you complete any replacement procedure, ensure you connect any external devices, cards, and cables before turning on your computer.

1. Replace the cover (see Removing the Cover).

CAUTION: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

2. Connect any telephone or network cables to your computer.
3. Connect your computer and all attached devices to their electrical outlets.
4. Turn on your computer.
5. Verify that the computer works correctly by running the Dell Diagnostics. See Dell Diagnostics.

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Removing and Replacing Parts

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- Cover
- Drive Cage
- Optical Drive
- Wireless Local Area Network (WLAN) Card
- System Fan
- Heat Sink and Processor
- Intrusion Switch
- Coin-Cell Battery
- System Board
- Front Bezel
- Hard Drive
- Control Panel
- Internal Antenna Cable
- Internal Speaker
- Memory
- I/O Board
- Power Supply

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Specifications

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NOTE: Offerings may vary by region. For more information regarding the configuration of your computer, click **Start® Help and Support** and select the option to view information about your computer.

Processor	
Type	Intel® Core™ 2 Duo, Intel Pentium® Dual-Core, Intel Celeron® Dual-Core, Intel Celeron
Level 2 (L2) cache	512 KB to 6 MB

Memory	
Type	DDR3 SDRAM (non-ECC memory only)
Speed	1066 MHz
Connectors	two
Capacity	1 GB or 2 GB
Minimum memory	1 GB
Maximum memory	4 GB

Video	
Integrated	Intel Q45 graphics controller

Audio	
Integrated	ADI 1984A High Definition Audio Codec

Network	
Integrated	Intel 82567 Gigabit 1 LAN 10/100/1000 Mbps

System Information	
Chipset	Intel Q45 Express chipset with ICH10DO
DMA channels	8
Interrupt levels	24
BIOS chip (NVRAM)	64 Mb (8 MB)

Expansion Bus	
Bus type	SATA 1.0A and 2.0 USB 2.0
Bus speed	SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps

Cards	
PCI	not available
PCI Express x1	not available
PCI Express x16	not available

Drives	
Externally accessible	
slimline drive bays	one bay for SATA DVD-ROM / DVD+/–RW
Internally accessible	
2.5-inch drive bays	one

External Connectors	
Audio	
back panel	two connectors: line-out (headphone) and line-in (microphone)
front panel	two connectors: line-out (headphone) and line-in (microphone)
Network	one RJ45 connector
Serial	one 9-pin connector; 16550C compatible
USB	
front panel	two
back panel	five
eSATA	one
Video	15-pin VGA connector 20-pin DisplayPort™ connector **NOTE:** Available video connectors may vary based on the graphics card selected.

System Board Connectors	
Serial ATA	two 7-pin connectors
Memory	four 240-pin connectors
Internal USB device	one 10-pin connector (supports two USB ports)
Processor fan	one 4-pin connector
System fan	one 3-pin connector
Front panel control	one 9-pin connector
Front panel audio	one 10-pin connector
Processor	one socket N
Power 12 V	one 4-pin connector
Power	one 24-pin connector

Power	
Wattage	180 W
Maximum heat dissipation (MHD)	750 BTU/hr
Voltage	90–264 VAC, 47–63 Hz, 2.6 A
Coin-cell battery	3 V CR2032 lithium coin cell
NOTE: Heat dissipation is calculated by using the power supply wattage rating.	
NOTE: See the safety information that shipped with your computer for important voltage setting information	

Physical	

Height	23.7 cm (9.3 inches)
Width	6.5 cm (2.6 inches)
Depth	24.0 cm (9.4 inches)
Weight	3.2 kg (7 lb)

Environmental	
Temperature	
Operating	10 °C to 35 °C (50 °F to 95 °F)
Storage	–40 °C to 65 °C (–40 °F to 149 °F)
Relative humidity (noncondensing)	operating: 20% to 80% storage: 5% to 95%
Maximum vibration	
Operating	5–350 Hz at 0.0002 G^2/Hz
Storage	5–500 Hz at 0.001 to 0.01 G^2/Hz
Maximum shock	
Operating	40 G +/– 5% with pulse duration of 2 msec +/– 10% (equivalent to 20 in/sec [51 cm/sec])
Storage	105 G +/– 5% with pulse duration of 2 msec +/– 10% (equivalent to 50 in/sec [127 cm/sec])
Altitude	
Operating	–15.2 m to 3048 m (–50 ft to 10,000 ft)
Storage	–15.2 m to 10,668 m (–50 ft to 35,000 ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

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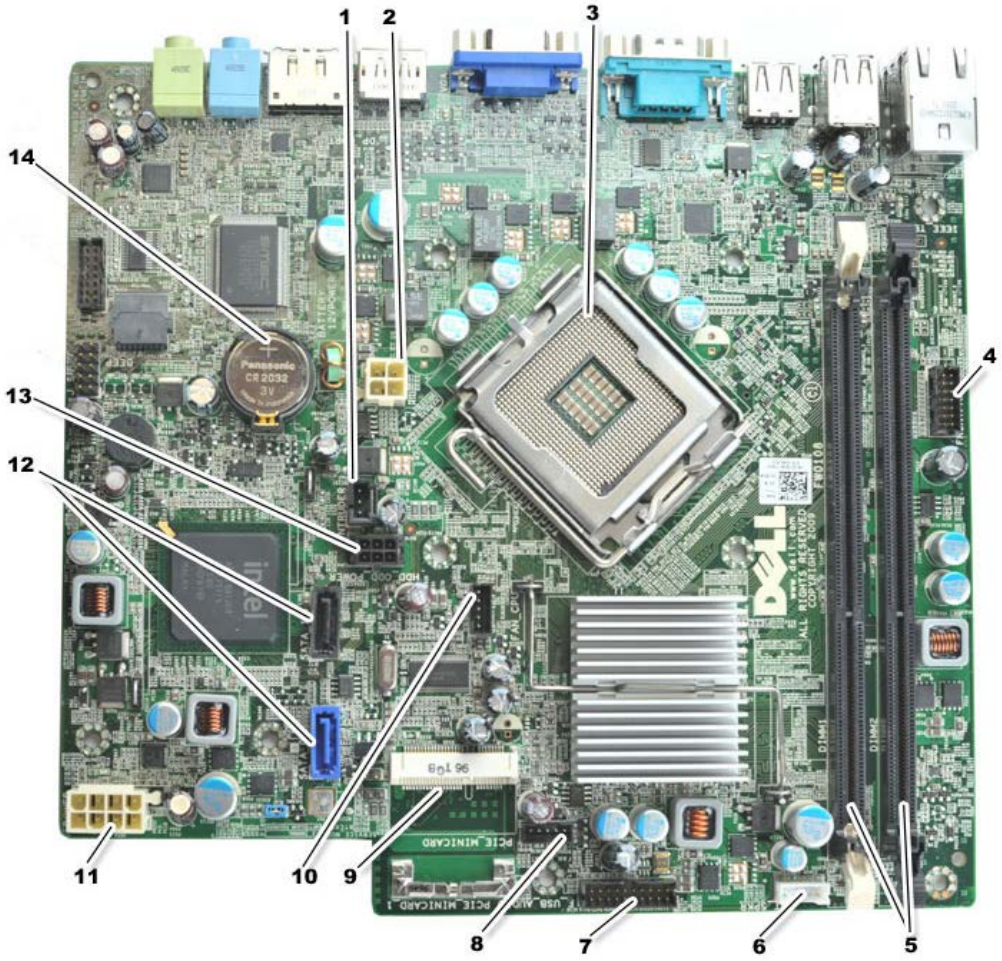
System Board Layout

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.



1	intrusion switch connector (INTRUDER)	2	power connector (POWER)
3	processor connector (CPU)	4	front-panel connector (FRONTPANEL)
5	memory module connectors (DIMM_1, DIMM_2)	6	internal speaker connector
7	front-panel connector (FRONTPANEL)	8	front-fan connectors (FAN_FRONT)
9	PCI-E mini card (PCIE_MINICARD)	10	fan connectors (FAN_CPU)
11	power connector (POWER)	12	SATA drive connectors (SATA0, SATA1)
13	hard-drive or optical-drive power connector (HDD_ODD_POWER)	14	battery socket (BATTERY)

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System Setup

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- Overview
- System Setup Options
- Booting to a USB Device
- Password Protection
- Clearing Forgotten Passwords
- Entering System Setup
- Boot Sequence
- Booting to a USB Device
- Jumper Settings
- Clearing CMOS Settings

Overview

Use System Setup to:

- Change the system configuration information after you add, change, or remove any hardware in your computer
- Set or change a user-selectable option such as the user password
- Read the current amount of memory or set the type of hard drive installed

Before you use System Setup, it is recommended that you write down the System Setup screen information for future reference.

△ **CAUTION: Unless you are an expert computer user, do not change the settings for this program. Certain changes can make your computer work incorrectly.**

Entering System Setup

1. Turn on (or restart) your computer.
2. When the DELL™ logo is displayed, watch for the F12 prompt to appear.
3. Press <F12> immediately. The **Boot Menu** appears.
4. Use the up and down arrow keys to select **System Setup** and then press <Enter>.

NOTE: The F12 prompt indicates that the keyboard has initialized. This prompt can appear very quickly, so you must watch for it to display, and then press <F12>. If you press <F12> before you are prompted, this keystroke will be lost.

5. If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then, shut down your computer and try again.

System Setup Screen

The System Setup screen displays current or changeable configuration information for your computer. Information on the screen is divided into two areas: the menu, and the main window.

Options List — This field appears on the left side of the system setup window. The field is a scrollable list containing features that define the configuration of your computer, including installed hardware, power conservation, and security features.	Option Field — This field contains information about each option. In this field you can view your current settings and make changes to your settings.

	Use the Tab and Up/Down arrow keys on your keyboard to navigate or click to navigate using the mouse.

System Setup Options

NOTE: Depending on your computer and installed devices, the items listed in this section may not appear, or may not appear exactly as listed.

WARNING: eSATA is designed to function only if the SATA Operation mode in system Setup (BIOS) is set to either IRRT or AHCI. If it is set to ATA, the eSATA functionality is lost though the connector can still be used as a USB port.

General	
System Board	Displays the following information: • System information: Displays **BIOS Info**, **System Info,** and the **Service Tag.** • Memory information: Displays **Installed Memory**, **Usable Memory, Memory Speed, Memory Channel Mode,** and **Memory Technology.** • Processor information: Displays the **Processor Type, Processor Speed, Processor Bus Speed, Processor L2 cache, Processor ID.** • PCI information: Displays available slots on the system board.
Date/Time	Displays the system date and time. Changes to the system date and time take effect immediately.
Boot Sequence	Specifies the order in which the computer attempts to find an operating system from the devices specified in this list.

Drives	
Diskette drive	Identifies and defines the floppy drive attached to the FLOPPY connector on the system board as: • **Disable** • **USB** • **Internal** (default) • **Read Only**
SATA Operation	Configures the operating mode of the integrated hard drive controller to: • **AHCI** (default) • **ATA** • **Legacy**
S.M.A.R.T. Reporting	Enables or disables integrated drive errors to be reported during system startup. This option is disabled by default.
Drives	Enables or disables the SATA or ATA drives connected to the system board.

System Configuration	
Integrated NIC	Enables or disables the integrated network card. You can set the integrated NIC to: • **Enable** (default) • **Disable** • **Enable with PXE** • **Enable with ImageSever**
USB Controller	Enables or disables the integrated USB controller. You can set the USB controller to: • **Enable** (default) • **Disable** • **No boot**
Parallel Port	Identifies and defines the parallel port settings. You can set the parallel port to:

	• **Disable** • **AT** • **PS/2 (default)** • **EPP** • **ECP No DMA** • **ECP DMA 1** • **ECP DMA 3**
Parallel Port Address	Sets the base I/O address of the integrated parallel port.
Serial Port #1	Identifies and defines the serial port settings. You can set the serial port to: • **Disable** • **Auto** (default) • **COM1** • **COM3** **NOTE:** Auto, the default setting, automatically configures a connector to a particular designation (COM1 or COM3).
Miscellaneous Devices	Enables or disables the following onboard devices: • **Front USB** • **Rear Dual USB** • **Rear Quad USB** • **PCI slots** • **Audio**

Video	
Primary Video	Specifies which video controller is primary when two video controllers are present on the computer. • **Auto** (default) • **Onboard/PEG**

Performance	
Multi Core Support	Specifies whether one or all the cores of the processor will be enabled. **NOTE:** The performance of some applications improve with additional cores.
Intel® SpeedStep™	Enables or disables the Intel SpeedStep mode. This option is disabled by default.
Limit CPUID Value	Enables or disables the CPUID limit. This option is disabled by default.
HDD Acoustic Mode	Sets the performance speed and noise level of your hard drive to: • **Bypass** (default) • **Quiet** • **Suggested** • **Performance**

Virtualization Support	
VT for Direct I/O	Enables or disables the Virtual Machine Monitor (VMM) from utilizing the additional hardware capabilities provided by Intel Virtualization technology for direct I/O.

Security	
Administrative Password	Provides restricted access to the computer's system setup program in the same way that access to the system can be restricted with the **System Password** option. This option is not set by default.
System Password	Displays the current status of the system's password security feature and allows a new system

	password to be assigned and verified. This option is not set by default.
Password Changes	Enables or disables the user from changing the system password without the administrative password. This option is enabled by default.
TPM Security	Enables or disables the trusted platform module (TPM) security. You can set the TPM security to: • **Deactivate** (default) • **Activate** • **Clear** **NOTE:** When TPM Security is set to **Clear** the system setup program clears the user information stored in the TPM.
CPU XD Support	Enables or disables the execute disable mode of the processor. This option is enabled by default.
Computrace(R)	Enables or disables the optional Computrace® service designed for asset management. You can set this option to: • **Deactivate** (default) • **Disable** • **Activate**
SATA-0 Password	Displays the current status of the password set for the hard drive connected to the SATA-0 connector on the system board. You can also set a new password. This option is not set by default. **NOTE:** The system setup program displays a password for each of the hard drives connected to your system board.

Power Management	
AC Recovery	Determines how the system responds when AC power is re-applied after a power loss. You can set the AC Recovery to: • **Power Off** (default) • **Power On** • **Last State**
Auto On Time	Sets time to automatically turn on the computer. Time is kept in the standard 12-hour format (hours:minutes:seconds). Change the startup time by typing the values in the time and AM/PM fields. **NOTE:** This feature does not work if you turn off your computer using the switch on a power strip or surge protector or if **Auto Power On** is set to **disabled**.
Low Power Mode	Enables or disables low power mode. This option is disabled by default. **NOTE:** When low power mode is enabled, the integrated network card is disabled.
Remote Wakeup	Allows the system to power up when a network interface controller receives a wake up signal**. You can set Remote Wakeup to:** • **Disable** (default) • **Enable** • **Enable with Boot NIC**
Suspend Mode	

	Sets the power management suspend mode to: • **S1** • **S3** (default) NOTE: If the AMT Management Engine (ME) of the system is **disabled**, the S1 suspend mode is unavailable in the system setup.
Fan Control Override	Controls the speed of the system fan. **NOTE:** When enabled, the fan runs at full speed.

Maintenance	
Service Tag	Displays the Service Tag of your computer.
Asset Tag	Allows you to create a system asset tag if an asset tag is not already set. This option is not set by default.
SERR Messages	Controls the SERR Message mechanism. This option is enabled by default. Some graphics cards require the SERR Message mechanism be disabled.

Image Server	
Lookup Method	Specifies how the ImageServer looksup the server address. • **Static IP** • **DNS** **NOTE:** You must set the **Integrated NIC** to **Enable with ImageServer** to set the **Lookup Method**.
ImageServer IP	Specifies the primary static IP address of the ImageServer with which the client software communicates. The default IP address is **255.255.255.255** **NOTE:** You must set the **Integrated NIC** to **Enable with ImageServer** to set the **ImageServer IP**.
ImageServer Port	Specifies the primary IP port of the image server with which the client software communicates. The default IP port is **06910**.
Client DHCP	Specifies how the client obtains the IP address. • **Static IP** • **DHCP** (default)
Client IP	Specifies the static IP address of the client. The default IP address is **255.255.255.255** **NOTE:** To set **Client IP** you must set **Client DHCP** to **Static IP**
Client SubnetMask	Specifies the subnet mask for the client. The default setting is **255.255.255.255** **NOTE:** To set **Client SubnetMask** you must set **Client DHCP** to **Static IP**
Client Gateway	Specifies the gateway IP address for the client. The default setting is **255.255.255.255** **NOTE:** To set **Client SubnetMask** you must set **Client DHCP** to **Static IP**
License Status	Displays the current license status.

Post Behavior	
Fast Boot	When enabled (default), your computer starts more quickly because it skips certain configurations and tests.
NumLock LED	Enables or disables the NumLock feature when your computer starts. When enabled (default), this option activates the numeric and mathematical features shown at the top of each key. When disabled, this option activates the cursor-control functions labeled on the bottom of each key
POST Hotkeys	Allows you to specify the function keys to display on the screen when the computer starts. • **Enable F2 = Setup** (enabled by default) • **Enable F12 = Boot menu** (enabled by default)
Keyboard Errors	Enables or disables keyboard error reporting when the computer starts. This option is enabled by default.

System Logs	
BIOS Events	Displays the system event log and allows you to: • **Clear Log** • **Mark all Entries**

Boot Sequence

This feature allows you to change the Boot Device Property for devices.

Option Settings

- **Onboard USB Floppy Drive —** The computer attempts to boot from the floppy drive.
- **Onboard SATA Hard Drive —** The computer attempts to boot from the hard drive.
- **USB Device** — The computer attempts to boot from a removable device, such as a USB key.
- **CD/DVD** — The computer attempts to boot from the disc drive.

Changing the Boot Sequence for the Current Boot

You can use this feature, for example, to restart your computer to a USB device, such as a floppy drive, memory key, or optical drive.

1. If you are booting to a USB device, connect the USB device to a USB connector.
2. Turn on (or restart) your computer.
3. When `F12 = Boot Menu` appears in the upper-right corner of the screen, press <F12>.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer and try again.
4. The **Boot Menu** appears, listing all available boot devices.
5. Use the arrow keys to select the appropriate device (for the current boot only).

NOTE: To boot to a USB device, the device must be bootable. To ensure that a device is bootable, check the device documentation.

Changing the Boot Sequence for Future Boots

1. Enter System Setup (see Entering System Setup).
2. Click to expand **SystemBoard** and then click **Boot Sequence**.
3. Highlight the appropriate device from the list of devices on the right and then click the up or down arrows to move the item you want to change.
4. Click **Apply** to save the changes and then click **Exit** to exit System Setup and resume the boot process.

Booting to a USB Device

NOTE: To boot to a USB device, the device must be bootable. To ensure that your device is bootable, check the device documentation.

Memory Key

1. Insert the memory key into a USB port and restart the computer.
2. When `F12 = Boot Menu` appears in the upper-right corner of the screen, press <F12>.

   The BIOS detects the device and adds the USB device option to the boot menu.
3. From the boot menu, select the number that appears next to the USB device.

   The computer boots to the USB device.

Floppy Drive

1. In system setup, set the **Diskette Drive** option to **USB**.
2. Save and exit system setup.
3. Connect the USB floppy drive, insert a bootable floppy, and re-boot the computer.

Password Protection

CAUTION: Although passwords provide security for the data on your computer, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.

System Password

CAUTION: If you leave your computer running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard drive.

Option Settings

You cannot change or enter a new system password if either of the following two options is displayed:

- **Set** — A system password is assigned.
- **Disabled —** The system password is disabled by a jumper setting on the system board.

You can only assign a system password when the following option is displayed:

- **Not Set** — No system password is assigned and the password jumper on the system board is in the enabled position (the default setting).

Assigning a System Password

To exit without assigning a system password, press <Esc> at any time (before you press the **OK** button in step 4).

1. Enter system setup (see Entering System Setup).
2. Select **System Password**, and verify that **Password Status** is set to **Not Set**.
3. Type your new system password.

   You can use up to 32 characters. To erase a character when entering your password, press <Backspace>. The password is case sensitive.

   Certain key combinations are not valid. If you enter one of these invalid combinations, the speaker emits a beep.

   As you press each character key (or the spacebar for a blank space), a placeholder appears.
4. Type your new password a second time to confirm and press **OK** button.

   The password setting changes to **Set**.

Typing Your System Password

When you start or restart your computer, the following prompt appears on the screen.

If **Password Status** is set to **Locked**:

```
Type the password and press <Enter>.
```

If you have assigned an administrator password, the computer accepts your administrator password as an alternate system password.

If you type a wrong or incomplete system password, the following message appears on the screen:

```
** Incorrect password. **
```

If you again type an incorrect or incomplete system password, the same message appears on the screen. The third and subsequent times you type an incorrect or incomplete system password, the computer displays the following message:

```
** Incorrect password. **
Number of unsuccessful password attempts: 3
System halted! Must power down.
```

Even after your computer is turned off and on, the previous message is displayed each time you type an incorrect or incomplete system password.

NOTE: You can use **Password Status** in conjunction with **System Password** and **Admin Password** to further protect your computer from unauthorized changes.

Deleting or Changing an Existing System Password

1. Enter system setup (see Entering System Setup).
2. Go to **Security**® **System Password** and press <Enter>.
3. When prompted, type the system password.
4. Press <Enter> twice to clear the existing system password. The setting changes to **Not Set**.

   If **Not Set** is displayed, the system password is deleted. If **Not Set** is not displayed, press <Alt><b> to restart the

computer, and then repeat steps 3 and 4.

5. To assign a new password, follow the procedure in Assigning a System Password.
6. Exit system setup.

Administrator Password

Option Settings

You cannot change or enter a new administrator password if either of the following two options is displayed:

- **Set** — An administrator password is assigned.
- **Disabled —** The administrator password is disabled by a jumper setting on the system board.

You can only assign an administrator password when the following option is displayed:

- **Not Set** — No administrator password is assigned and the password jumper on the system board is in the enabled position (the default setting).

Assigning an Administrator Password

The administrator **password** can be the same as the system password.

NOTE: If the two passwords are different, the administrator password can be used as an alternate system password. However, the system password cannot be used in place of the administrator password.

1. Enter system setup (see Entering System Setup) and verify that **Admin Password** is set to **Not Set.**
2. Select **Admin Password** and press <Enter>.
3. Type your new administrator password.

   You can use up to 32 characters. To erase a character when entering your password, press <Backspace>. The password is case sensitive.

   Certain key combinations are not valid. If you enter one of these invalid combinations, the speaker emits a beep.

   As you press each character key (or the spacebar for a blank space), a placeholder appears.
4. Type your new password a second time to confirm and press **OK** button. The password setting changes to **Set**.
5. Exit system setup.

   A change to **Admin Password** becomes effective immediately (no need to restart the computer).

Operating Your Computer With an Administrator Password Enabled

When you enter system setup, the **Admin Password** option is highlighted, prompting you to type the password.

If you do not type the correct password, the computer lets you view, but not modify, system setup options.

NOTE: You can use **Password Status** in conjunction with **Admin Password** to protect the system password from unauthorized changes.

Deleting or Changing an Existing Administrator Password

To change an existing administrator password, you must know the administrator password.

1. Enter system setup (see Entering System Setup).
2. Type the administrator password at the prompt.
3. Highlight **Admin Password** and press the left- or right-arrow key to delete the existing administrator password.

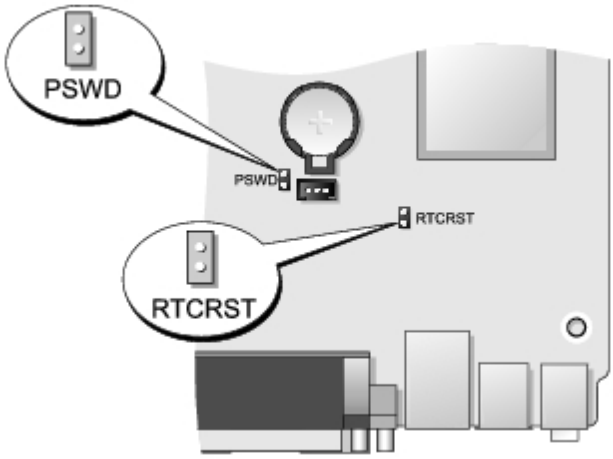
   The setting changes to **Not Set**.

   To assign a new administrator password, perform the steps in Assigning an Administrator Password.
4. Exit system setup.

Disabling a Forgotten Password and Setting a New Password

To reset system and/or administrator passwords, see Clearing Forgotten Passwords.

Jumper Settings



Jumper	Setting	Description
PSWD		Password features are enabled (default setting).
		Password features are disabled.
RTCRST		The real-time clock has not been reset.
		The real-time clock is being reset (jumpered temporarily).
jumpered *unjumpered*		

Clearing Forgotten Passwords

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: This process erases both the system and administrator passwords.

1. Follow the procedures in Working on Your Computer.
2. Remove the computer cover.
3. Locate the 2-pin password jumper (PSWD) on the system board, and remove the jumper to clear the password. See Password Protection.
4. Replace the computer cover.
5. Connect your computer and monitor to electrical outlets, and turn them on.
6. After the Microsoft® Windows® desktop appears on your computer, shut down your computer.
7. Turn off the monitor and disconnect it from the electrical outlet.
8. Disconnect the computer power cable from the electrical outlet, and press the power button to ground the system board.
9. Open the computer cover.
10. Locate the 2-pin password jumper on the system board and attach the jumper to reenable the password feature.
11. Replace the computer cover.

CAUTION: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

12. Connect your computer and devices to electrical outlets, and turn them on.

NOTE: This procedure enables the password feature. When you enter system setup (see Entering System Setup), both system and administrator password options appear as **Not Set**—meaning that the password feature is enabled but no password is assigned.

13. Assign a new system and/or administrator password.

Clearing CMOS Settings

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

1. Follow the procedures in Working on Your Computer.
2. Remove the cover.
3. Reset the current CMOS settings:
    a. Locate the password (PSWD) and CMOS (RTCRST) jumpers on the system board (see Password Protection).
    b. Remove the password jumper plug from its pins.
    c. Place the password jumper plug on the RTCRST pins and wait approximately 5 seconds.
    d. Remove the jumper plug from the RTCRST pins and place it back on the password pins.
4. Replace the computer cover.

CAUTION: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

5. Connect your computer and devices to electrical outlets, and turn them on.

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Diagnostics

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

- Dell Diagnostics
- Power Button Light Codes
- Beep Codes
- Diagnostic Lights

Dell Diagnostics

When to Use the Dell Diagnostics

It is recommended that you print these procedures before you begin.

NOTE: The Dell Diagnostics software works only on Dell computers.

NOTE: The *Drivers and Utilities* media is optional and may not ship with your computer.

Enter system setup (see Entering System Setup), review your computer's configuration information, and ensure that the device you want to test displays in System Setup and is active.

Start the Dell Diagnostics from either your hard drive or from the *Drivers and Utilities* media.

Starting the Dell Diagnostics From Your Hard Drive

1. Turn on (or restart) your computer.
2. When the DELL logo appears, press <F12> immediately.

NOTE: If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from your *Drivers and Utilities* media.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

3. When the boot device list appears, highlight **Boot to Utility Partition** and press <Enter>.
4. When the Dell Diagnostics **Main Menu** appears, select the test that you want to run.

Starting the Dell Diagnostics From the Drivers and Utilities Disc

1. Insert the *Drivers and Utilities* disc.
2. Shut down and restart the computer.

When the DELL logo appears, press <F12> immediately.

If you wait too long and the Windows logo appears, continue to wait until you see the Windows desktop. Then shut down your computer and try again.

NOTE: The next steps change the boot sequence for one time only. On the next startup, the computer boots according to the devices specified in the system setup program.

3. When the boot device list appears, highlight **Onboard or USB CD-ROM Drive** and press <Enter>.
4. Select the **Boot from CD-ROM** option from the menu that appears and press <Enter>.
5. Type 1 to start the menu and press <Enter> to proceed.

6. Select **Run the 32 Bit Dell Diagnostics** from the numbered list. If multiple versions are listed, select the version appropriate for your computer.
7. When the Dell Diagnostics **Main Menu** appears, select the test you want to run.

Dell Diagnostics Main Menu

1. After the Dell Diagnostics loads and the **Main Menu** screen appears, click the button for the option you want.

Option	Function
Express Test	Performs a quick test of devices. This test typically takes 10 to 20 minutes and requires no interaction on your part. Run **Express Test** first to increase the possibility of tracing the problem quickly.
Extended Test	Performs a thorough check of devices. This test typically takes 1 hour or more and requires you to answer questions periodically.
Custom Test	Tests a specific device. You can customize the tests you want to run.
Symptom Tree	Lists the most common symptoms encountered and allows you to select a test based on the symptom of the problem you are having.

2. If a problem is encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description and follow the instructions on the screen.
3. If you run a test from the **Custom Test** or **Symptom Tree** option, click the applicable tab described in the following table for more information.

Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and may indicate requirements for running the test.
Configuration	Displays your hardware configuration for the selected device. The Dell Diagnostics obtains configuration information for all devices from system setup, memory, and various internal tests, and it displays the information in the device list in the left pane of the screen. The device list may not display the names of all the components installed on your computer or all devices attached to your computer.
Parameters	Allows you to customize the test by changing the test settings.

4. When the tests are completed, if you are running the Dell Diagnostics from the *Drivers and Utilities* disc, remove the disc.
5. Close the test screen to return to the **Main Menu** screen. To exit the Dell Diagnostics and restart the computer, close the **Main Menu** screen.

Power Button Light Codes

The diagnostic lights give much more information about the system state, but legacy power light states are also supported in your computer. The power light states are shown in following table.

Power Light State	Description
Off	Power is off, light is blank.
Blinking Amber	Initial state of light at power up. Indicates system has power, but the POWER_GOOD signal is not yet active. If the **Hard Drive light is off**, it is probable that the power supply needs to be replaced. If the **Hard Drive light on**, it is probable that an onboard regulator or VRM has failed. Look at the diagnostic lights for further information.
Solid	

Amber	Second state of the light at power up. Indicates the POWER_GOOD signal is active and it is probable that the power supply is fine. Look at the diagnostic lights for further information.
Blinking Green	System is in a low power state, either S1 or S3. Look at the diagnostic lights to determine which state the system is in.
Solid Green	System is in S0 state, the normal power state of a functioning machine. The BIOS will turn the light to this state to indicate it has started fetching op-codes.

Beep Codes

If the monitor cannot display error messages during the POST, the computer may emit a series of beeps that identifies the problem or that can help you identify a faulty component or assembly. The following table lists the beep codes that may be generated during the POST. Most beep codes indicate a fatal error that prevents the computer from completing the boot routine until the indicated condition is corrected.

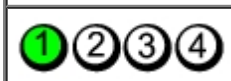
Code	**Cause**
1-1-2	Microprocessor register failure
1-1-3	NVRAM read/write failure
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval timer failure
1-2-2	DMA initialization failure
1-2-3	DMA page register read/write failure
1-3	Video Memory Test failure
1-3-1 through 2-4-4	Memory not being properly identified or used
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure
3-1-4	Slave interrupt mask register failure
3-2-2	Interrupt vector loading failure
3-2-4	Keyboard Controller Test failure
3-3-1	NVRAM power loss
3-3-2	Invalid NVRAM configuration
3-3-4	Video Memory Test failure
3-4-1	Screen initialization failure
3-4-2	Screen retrace failure
3-4-3	Search for video ROM failure
4-2-1	No timer tick
4-2-2	Shutdown failure
4-2-3	Gate A20 failure
4-2-4	Unexpected interrupt in protected mode
4-3-1	Memory failure above address 0FFFFh
4-3-3	Timer-chip counter 2 failure
4-3-4	Time-of-day clock stopped
4-4-1	Serial or parallel port test failure

4-4-2	Failure to decompress code to shadowed memory
4-4-3	Math-coprocessor test failure
4-4-4	Cache test failure

Diagnostic Lights

To help troubleshoot a problem, your computer has four lights labeled 1, 2, 3, and 4 on the bank panel. When the computer starts normally, the lights flash before turning off. If the computer malfunctions, the sequence of the lights help to identify the problem.

NOTE: After the computer completes POST, all four lights turn off before booting to the operating system.

Light Pattern	Problem Description	Suggested Resolution
	The computer is in a normal *off* condition or a possible pre-BIOS failure has occurred. The diagnostic lights are not lit after the computer successfully boots to the operating system.	• Plug the computer into a working electrical outlet. • If the problem persists, contact Dell.
	A possible processor failure has occurred.	• Reseat the processor (see Processor information for your computer). • If the problem persists, contact Dell.
	Memory modules are detected, but a memory failure has occurred.	• If two or more memory modules are installed, remove the modules, then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install working memory of the same type into your computer. • If the problem persists, contact Dell.
	A possible graphics card failure has occurred.	• Reseat any installed graphics cards. • If available, install a working graphics card into your computer. • If the problem persists, contact Dell .
	A possible floppy drive or hard drive failure has occurred.	Reseat all power and data cables.
	A possible USB failure has occurred.	Reinstall all USB devices and check all cable connections.
	No memory modules are detected.	• If two or more memory modules are installed, remove the modules, then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install working memory of the same type into your computer. • If the problem persists, contact Dell.
	Memory modules are detected, but a memory configuration or compatibility error has occurred.	• Ensure that no special requirements for memory module/connector placement exist. • Ensure that the memory you are using is supported by your computer (see the "Specifications" section for your computer). • If the problem persists, contact Dell.
	A possible expansion card failure has occurred.	• Determine if a conflict exists by removing an expansion card (not a graphics card) and restarting the computer. • If the problem persists, reinstall the card you removed, then remove a different card and restart the computer.

		• Repeat this process for each expansion card installed. If the computer starts normally, troubleshoot the last card removed from the computer for resource conflicts. • If the problem persists, contact Dell.
	Another failure has occurred.	• Ensure that all hard drive and optical drive cables are properly connected to the system board . • If there is an error message on the screen identifying a problem with a device (such as the floppy drive or hard drive), check the device to make sure it is functioning properly. • If the operating system is attempting to boot from a device (such as the floppy drive or optical drive), check system setup to ensure the boot sequence is correct for the devices installed on your computer. • If the problem persists, contact Dell.

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Cover

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WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing the Cover

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Loosen the thumb screw.

3. Slide the cover towards the back of the computer and remove the cover from the computer.

Replacing the Cover

To replace the cover, perform the above steps in reverse order.

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Cover

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Removing the Cover

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1. Follow the procedures in Before Working Inside Your Computer.
2. Loosen the thumb screw.

3. Slide the cover towards the back of the computer and remove the cover from the computer.

Replacing the Cover

To replace the cover, perform the above steps in reverse order.

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Drive Cage

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

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Removing the Drive Cage

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Using the handle, gently lift the drive cage to release it from the computer chassis.

5. Disconnect the power and data cables from the optical drive.

6. Flip over the drive cage and place it on the computer.

7. Disconnect the power and data cables from the hard drive.

8. Remove the drive cage from the computer.

Replacing the Drive Cage

To replace the drive cage, perform the above steps in reverse order.

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Optical Drive

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

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Removing the Optical Drive

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Push the retention clip to release the optical-drive assembly from the computer, then remove the assembly from the computer.

6. Remove the optical-drive bracket from the optical-drive assembly.

Replacing the Optical Drive

To replace the optical drive, perform the above steps in reverse order.

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Wireless Local Area Network (WLAN) Card

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

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Removing the WLAN Card

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Disconnect the antenna cables from the WLAN card.

6. Push the levers that secure the WLAN card to the computer away from the WLAN card.

7. Remove the WLAN card from the connector on the system board.

Replacing the WLAN Card

To replace the WLAN card, perform the above steps in reverse order.

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System Fan

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Removing the System Fan

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Disconnect the fan cable from the system board.

6. Release the fan cable from its routing on the computer.

7. Remove the screws that secure the fan to the computer chassis.

8. Remove the system fan from the computer.

Replacing the System Fan

To replace the system fan, perform the above steps in reverse order.

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Heat Sink and Processor

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing the Heat Sink and Processor

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Disconnect the fan cable from the system board.

6. Loosen the captive screws on the heat sink.

7. Lift the heat sink out of the computer.

8. Press the release lever down and out to release the processor cover.

9. Open the processor cover.

10. Remove the processor from the system board.

Replacing the Heat Sink and Processor

To replace the heat sink and processor, perform the above steps in reverse order.

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Intrusion Switch

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

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Removing the Intrusion Switch

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Disconnect the intrusion switch cable from the computer.

6. Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

Replacing the Intrusion Switch

To replace the intrusion switch, perform the above steps in reverse order.

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Coin-Cell Battery

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WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing the Coin-Cell Battery

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Remove the system fan.
6. Remove the heat sink and processor.
7. Remove the power supply.
8. Pull the retention clip away from the coin-cell battery.

9. Lift the coin-cell battery up and remove it from the system board.

Replacing the Coin-Cell Battery

To replace the coin-cell battery, perform the above steps in reverse order.

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System Board

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Removing the System Board

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Remove the heat sink and processor.
6. Remove the power supply.
7. Remove the memory.
8. Remove the I/O board.
9. Remove the wireless local area network card.
10. Remove the internal speaker.
11. Disconnect the optical-drive, hard-drive, internal speaker, and control-panel cables from the system board.

12. Disconnect the internal antenna cable.

13. Remove the screws that secure the system board to the computer chassis.

14. Remove the 7 mm hex screw from the system board.

15. Remove the system board from the computer.

Replacing the System Board

To replace the system board, perform the above steps in reverse order.

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Front Bezel

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing the Front Bezel

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Gently pry the front-bezel retention clips away from the computer.

4. Rotate the front bezel away from the computer.

5. Remove the front bezel from the computer.

Replacing the Front Bezel

To replace the front bezel, perform the above steps in reverse order.

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Hard Drive

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

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Removing the Hard Drive

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Remove the screws that secure the hard drive to the drive cage.

6. Slide the hard drive out of the drive cage and remove the hard drive from the computer.

Replacing the Hard Drive

To replace the hard drive, perform the above steps in reverse order.

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Control Panel

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing the Control Panel

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Disconnect the control panel cable from the system board.

6. Remove the cable from the routing guides on the computer chassis.

7. Remove the screw that secures the control panel to the computer.

8. Remove the control panel from the computer.

Replacing the Control Panel

To replace the control panel, perform the above steps in reverse order.

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Internal Antenna Cable

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WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing the Internal Antenna Cable

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Disconnect the antenna cables from the WLAN card.

6. Remove the internal antenna cable from the routing guides on the computer chassis.

7. Carefully release the internal antenna port from the computer chassis.

8. Remove the internal antenna cable from the computer.

Replacing the Internal Antenna Cable

To replace the internal antenna cable, perform the above steps in reverse order.

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Internal Speaker

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Removing the Internal Speaker

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Remove the system fan.
6. Disconnect the speaker cable from its connector on the system board.

7. Push in on the release tab and rotate the speaker to release it from the computer chassis.

8. Remove the speaker from the computer.

Replacing the Internal Speaker

To replace the internal speaker, perform the above steps in reverse order.

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Memory

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WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing the Memory Module(s)

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Push down on the memory retention clips to release the memory module from its connector.

6. Lift the memory module out of the connector and remove it from the computer.

Replacing the Memory Module(s)

To replace the memory, perform the above steps in reverse order.

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I/O Panel

Dell™ OptiPlex™ 780 Ultra Small Form Factor—Service Manual

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Removing the I/O Panel

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Disconnect the I/O panel data cable from the system board.

6. Remove the screws that secure the I/O panel to the computer chassis.

7. Remove the I/O board by pulling it away from the computer.

Replacing the I/O Panel

To replace the I/O panel, perform the above steps in reverse order.

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Power Supply

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Removing the Power Supply

NOTE: You may need to install Adobe® Flash® Player from **Adobe.com** in order to view the illustrations below.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the cover.
3. Remove the front bezel.
4. Remove the drive cage.
5. Remove the intrusion switch.
6. Remove the heat sink and processor.
7. Disconnect the power cables from the system board.

8. Remove the screw that secures the power supply to the system board.

9. Remove the screws that secure the power supply to the computer chassis.

10. Slide the power supply towards the fan and remove it from the computer.

Replacing the Power Supply

To replace the power supply, perform the above steps in reverse order.

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